by botanists the world over. So it will be with the Slime Moulds, that are "passing," to be replaced by the Slime Animals.

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SCIENTIFIC JOURNALS AND ARTICLES

THE May number (Vol. 18, No. 8) of the *Bulletin of the American Mathematical Society* contains the following papers: "Definite integrals containing a parameter," by D. C. Gillespie; "On the V_3^3 with five binodes of the second species in S_4," by S. Lefschetz; "What is mathematics" (review of Whitehead and Russell's "Principia Mathematica"), by J. B. Shaw; Review of Bianchi-Lukat's "Differentialgeometrie," by L. P. Eisenhart; "Notes"; "New Publications."

The June number of the *Bulletin* contains: Report of the April meeting of the Chicago Section, by H. E. Slaught; Report of the twenty-first regular meeting of the San Francisco Section, by T. M. Putnam; "Implicit functions defined by equations with vanishing Jacobian," by G. R. Clements; Review of Darwin's Scientific Papers, by E. W. Brown; Review of Pareto's "Manuel d'Economie politique," by E. B. Wilson; "Notes"; "New Publications."

SPECIAL ARTICLES

THE LAWS OF PHOTOELECTRIC ACTION AND THE UNITARY THEORY OF LIGHT (LICHTQUANTEN THEORIE)

IN a note which was published in a recent number of SCIENCE (Vol. 35, p. 783, May 17, 1912) Dr. Karl T. Compton and the writer announced, as the result of experiments, certain conclusions they had come to regarding the relation between the number and kinetic energy of the electrons emitted by different metals under the influence of light, on the one hand, and the frequency of the light and the position of the metals in the voltaic series, on the other. The following brief outline of a method of deducing and extending these laws from theoretical considerations, is not without interest.

Let N_v be the number of electrons emitted in unit time by unit area of a metal in the presence of unit density of isotropic radiation of frequency between v and $v+dv$, let T_m represent the maximum kinetic energy of these electrons and T_v their mean kinetic energy. The writer[1] has shown that N_v and T_m have to satisfy equations which can be reduced to

$$\int_0^\infty N_v h v^3 e^{-hv/R\theta}\, dv = A_1 \theta^2 e^{-w_0/R\theta} \qquad (1)$$

and

$$\int_0^\infty N_v T_m h v^3 e^{-hv/R\theta}\, dv = 2A_1 R\theta^3 e^{-w_0/R\theta}. \qquad (2)$$

In these equations h is Planck's radiation constant, A_1 is a constant characteristic of the material and independent of the temperature θ, w_0 is the internal latent heat of evaporation of one electron at the absolute zero and R is the gas constant reckoned for a single molecule. The following is a solution of equations (1) and (2):

$$N_v = 0, \text{ for } 0 < hv < w_0, \qquad (3)$$

$$N_v = \frac{A_1 h}{R^2 v^2}\left(1 - \frac{w_0}{hv}\right), \text{ for } w_0 < hv < \infty, \qquad (4)$$

$$T_m = hv - w_0, \text{ for } w_0 < hv < \infty. \qquad (5)$$

Equations (1) and (2) have to be slightly modified when reflection of the electrons is taken into account. The result does not appear to make any important difference in (3) and (4) but, instead of (5), we get

$$T_v = s(hv - w_0), \text{ for } w_0 < hv < \infty, \qquad (6)$$

where s is the ratio between the proportion of the incident energy which is absorbed, and the proportion of the incident matter (or electricity) which is absorbed, from the stream of electrons which returns to the body in a state of thermal equilibrium. It can be shown that s lies between zero and unity.

If we define v_0 by the equation $w_0 = hv_0$ it can easily be shown that the experimental results announced by Dr. Compton and the writer are confirmatory of equations (3), (5) and (6). One of the most interesting consequences of the theory is equation (4) which has not yet been tested by experiment.

[1] *Phys. Rev.*, Vol. 34, February and May, 1912; *Phil. Mag.*, Vol. 23, p. 615, 1912.